AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listing of claims in the application.

Listing of Claims

1. (Currently Amended) A semiconductor integrated circuit device having a plurality of memory cells formed on a semiconductor substrate, each made up by electrically connecting a resistor element in series with a field effect transistor comprising:

a plurality of first electrodes each connected to the field effect transistor which is included in a corresponding one of the plurality of memory cells;

a stacked layer film formed of a phase change material layer and a second electrode, deposited in that order, and connected to the plurality of first electrodes in common; and

a power source terminal connected to the second electrode layer,

wherein the phase change material layer is made of one phase change material layer ~~of~~ or plural phase change material layers with resistance values changing by heating treatments,

wherein the resistor element is a part of the stacked layer film,

wherein a surface area of each of the plurality of first electrodes is smaller than a surface area of the stacked layer film, and

wherein a phase change region is formed in a contact part between one of the plurality of first electrodes and the stacked layer.

2. (Previously Presented) A semiconductor integrated circuit device comprising a plurality of memory cells formed on a semiconductor substrate, each made up by electrically connecting a resistor element in series with a field effect transistor comprising:

a plurality of first electrodes each connected to either of a source or a drain of the field effect transistor which is included in a corresponding one of the plurality of memory cells;

a conductive film serving as a bit line of the memory cells and connected to the other of the source or the drain of the field effect transistor; and

a stacked layer film made up of a phase change material layer and a second electrode

layer, deposited in that order,

wherein the phase change material layer is made of one phase change material layer or plural phase change material layers with resistance values changing by heating treatments,

wherein the stacked layer film is formed on the conductive film through the intermediary of an insulation film so as to be connected to the plurality of first electrodes in common,

wherein the resistor element is a part of the stacked layer film,

wherein a surface area of each of the plurality of first electrodes is smaller than a surface area of the stacked layer film, and

wherein a phase change region is formed in a contact part between one of the plurality of first electrodes and the stacked layer.

3. (Cancelled)

4. (Previously Presented) A semiconductor integrated circuit device comprising a plurality of memory cells formed on a semiconductor substrate, each made up by electrically connecting a resistor element in series with a field effect transistor comprising:

a plurality of first electrodes each connected to either of a source or a drain of the field effect transistor which is included in a corresponding one of the plurality of memory cells; a conductive film serving as a bit line of the memory cells and connected to the other of the source or the drain of the field effect transistor; and

a stacked layer film made up of a phase change material layer and a second electrode layer, deposited in that order,

wherein the phase change material layer is made of one phase change material layer or plural phase change material layers with resistance values changing by heating treatments,

wherein the stacked layer film is formed on the conductive film through the intermediary of an insulation film and configured such that the phase change material layers are divided by the memory cell and the second electrode layer is common to the plurality of memory cells,

wherein the resistor element is a part of the stacked layer film,

wherein a surface area of each of the plurality of first electrodes is smaller than a surface area of the stacked layer film, and

wherein a phase change region is formed in a contact part between one of the plurality of first electrodes and the stacked layer.

5. (Previously Presented) A semiconductor integrated circuit device according to claim 1, each of the plurality of first electrodes is a plug layer made up by filling up a contact hole, formed in an insulation film, with a conductive material.

6. (Original) A semiconductor integrated circuit device according to claim 5, wherein the plug layer comprises a first plug layer connecting the other of the source and the drain, in the field effect transistor, with the bit lines, and

a second plug layer extended on the first plug layer and connected to the first electrode layer.

7. (Original) A semiconductor integrated circuit device according to claim 6, wherein the second plug layer is smaller in cross sectional area than the first plug layer.

8. (Original) A semiconductor integrated circuit device according to claim 6, wherein the second plug layer has an insulation thin film deposited along an inner peripheral sidewall of the contact hole.

9. (Original) A semiconductor integrated circuit device according to claim 6, wherein the second plug layer comprises a first conductive layer having a first resistance value and a second conductive layer having a resistance value higher than the first resistance value, and the second conductive layer is connected to the phase change material layer.

10. (Original) A semiconductor integrated circuit device according to claim 1, wherein

the phase change material layer comprises stacked layer films formed of a first phase change material layer made of a first melting point material, and a second phase change material layer made of a material having a melting point higher than that of the first melting point material layer, deposited in that order, and

the first phase change material layer is connected to either of the source and the drain, in the field effect transistor.

11. (Original) A semiconductor integrated circuit device according to claim 1, wherein the phase change material layer comprises a first phase change material layer in a crystallized state.

12. (Original) A semiconductor integrated circuit device according to claim 1, wherein the phase change material layer comprises a second phase change material layer in an amorphous state.

13. (Original) A semiconductor integrated circuit device according to claim 1, wherein the phase change material layer comprises stacked layer films formed of a first phase change material layer in a crystallized state, and a second phase change material layer in an amorphous state, deposited in that order, and

the first phase change material layer is connected to either of the source and the drain, in the field effect transistor.

14. (Original) A semiconductor integrated circuit device according to claim 1, wherein the phase change material layer comprises stacked layer films formed of a first phase change material layer in an amorphous state, and a second phase change material layer in a crystallized state, deposited in that order, and

the first phase change material layer is connected to either of the source and the drain, in the field effect transistor.

15. (Currently Amended) A semiconductor integrated circuit device according to claim 1, wherein the phase change material layer comprises stacked layer films formed of a first phase change material layer in an amorphous state, and a second phase change material layer in a crystallized state, deposited in that order, and

the first phase change material layer is connected to either of the source and the drain, in the field effect transistor, with a plug layer formed in ~~a~~ an insulation film, having an area where a portion of the first phase change material layer is crystallized due to Joule heat generated by flow of current to the plug layer.

16. (Original) A semiconductor integrated circuit device according to claim 1, wherein any material selected from the group consisting of TiN, TiAlN, and PolySi is provided in a portion of the second plug layer, connected to the resistor element.

17. (Original) A semiconductor integrated circuit device according to claim 1, wherein a molybdenum material is provided in a portion of the second plug layer, connected to the resistor element.

18. (Cancelled)